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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/873,803	06/04/2001	Patrick H. Dussud	MS174292.1	5420

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EXAMINER

WU, YICUN

ART UNIT	PAPER NUMBER
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2175

DATE MAILED: 05/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/873,803

Applicant(s)

DUSSUD ET AL.

Examiner

Yicun Wu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14, 16-21, 23-27, 29 and 31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14, 16-21, 23-27, 29 and 31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

DIANE D. MIZRAHI
PRIMARY PATENT EXAMINER
TECHNOLOGY CENTER 2100

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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III. DETAILED ACTION

1. Claims 1-14, 16-21, 23-27, 29 and 31 are presented for examination.

Claim Objections

2. Claims 12-20 are objected to because of the following informalities: method claims 23-27 depend on claim 21 which is a system claim and computer readable medium claims 29 and 31 depend on claim 27 which is a method claim. Further clarification and appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-14, 16-21, 23-27, 29 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bartlett (U.S. Patent 4,907,151) in view of Benson et al. (U.S. Patent 6,421,689).

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As to Claim 1, Bartlett discloses a system for executing managed and unmanaged code, comprising:

a garbage collection service that facilitate memory management (Bartlett col. 4, lines 32-43), and

declares at least one reference as pinned during execution of managed and unmanaged code (Bartlett col. 4, lines 32-43) (managed and unmanaged code are well known in the arts),

notifying the garbage collection service of the at least one pinned reference (Bartlett col. 4, lines 32-43),

so that objects associated with the at least one pinned reference are not relocated during the garbage collection service (Bartlett col. 4, lines 32-43).

Bartlett does not explicitly teaches an execution engine.

Benson et al. teaches an execution engine (Benson et al. col. 5, lines 15-27).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Bartlett with an execution engine.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Bartlett by the teaching of Benson et al. because providing the an execution engine allows quickly performing

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garbage collection as taught by Benson et al. (at col. 3, lines 42-44).

As to Claim 2, Bartlett as modified teaches a system the at least one reference being local variables referencing managed code during a call to unmanaged code (i.e. local variables) (Bartlett col. 8, lines 50-55 and col. 4, lines 32-43).

As to Claim 3, Bartlett as modified teaches a system further comprising a code manager operable to identify a set of roots of an executing program on a process stack, the set of roots comprising both references and pinned references (i.e. root storage area) (Bartlett col. 4, lines 32-43).

As to Claim 4, Bartlett as modified teaches a system the references being at least one of object references and interior references and the pinned references being at least one of pinned object references and pinned interior references (Bartlett col. 4, lines 32-43).

As to Claim 5, Bartlett as modified teaches a system:
the object references being pointers to object headers residing in the memory heap and the interior references being

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pointers to data members residing in object bodies in the memory heap (Bartlett col. 4, lines 32-43).

As to Claim 6, Bartlett as modified teaches a system:

the garbage collection service being operable to receive the references and pinned references from the code manager and trace through a memory heap to determine which memory segments are accessible and inaccessible, the garbage collection service then removing inaccessible objects, moving accessible objects that are not referenced by pinned references and holding objects fixed in memory that are referenced by pinned references (Bartlett col. 4, lines 32-43).

As to Claim 7, Bartlett as modified teaches a system the code manager and garbage collection service being invoked by a request for memory by the executing code (Bartlett col. 4, lines 32-43).

As to Claim 8, Bartlett as modified teaches a system:

the code manager and garbage collection service being invoked periodically (garbage collection service being invoked periodically is well known in the art).

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As to Claim 9, Bartlett as modified teaches a system, the code manager and garbage collection service being invoked when the memory heap becomes full (Bartlett col. 11, lines 8-32).

As to Claim 10, Bartlett as modified teaches a system:
the code manager and garbage collection service being part of a garbage collection system (Bartlett col. 4, lines 32-43).

As to Claim 11, Bartlett as modified teaches a system:
the garbage collection service being further operable to shift the non-garbage objects down in the memory heap to eliminate the inaccessible segments and to modify the program roots so that the references refer to the new locations of the objects in the memory heap, while holding fixed in memory non-garbage objects referenced by pinned references (Bartlett col. 4, lines 32-43).

As to Claim 12, Bartlett as modified teaches a system:
the execution engine operable to compile source code, the at least one pinned reference being declared as type pinned in the source code (Bartlett col. 4, lines 32-43).

As to Claim 13, Bartlett as modified teaches a system:

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the execution engine comprising a just-in-time compiler adapted to compile both managed source code and unmanaged source code in real-time (compiler is well known in the art).

As to Claim 14, Bartlett as modified teaches a system the the pinned references being limited to residing on the stack. (i.e. the present invention is able to operate using a constant amount of stack as its processing is iterative. (Bartlett col. 17, lines 65-67)).

5. As to claims 16-21, 23-27, 29 and 31 the limitations of these claims have been noted in the rejection above. They are therefore rejected as set forth above.

Prior Art Made of Record

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Ellis et al. (U.S. Patent No. 5,088,036);

Berry et al. (U.S. Patent No. 6,434,575).

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Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yicun Wu whose telephone number is 703-305-4889. The examiner can normally be reached on 8:00 am to 4:30 pm, Monday -Friday. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dov Popovici can be reached on 703-305-3830. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-746-7240 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Yicun Wu
Patent Examiner
Technology Center 2100

April 30, 2004

~~DIANE D. WZRAH~~
~~PRIMARY PATENT EXAMINER~~
~~TECHNOLOGY CENTER 2100~~